

LLNL Livermore Valley Open Campus (LVOC) at High Performance Computing Innovation Center (HPCIC)
Livermore • California

Agenda September 3 – 6, 2013

Tuesday, September 3, 2013 • HPCIC • Trailer 6475 • Telephone (925) 422-9173

Day 1 – Welcome and BOUT++ Overview Talks		
7:30 AM	Shuttle Bus Departs Promptly from Hampton Inn	2850 Constitution Drive Livermore (phone 925-606-6400)
7:50 AM	Arrival at LVOC at HPCIC (<i>refer to workshop website for directions, in necessary</i>) BOUT++ Workshop Badging, Wireless Accounts Setup and Morning Hospitality	All
8:45 AM	Welcome Address	Don Correll, LLNL
8:55 AM	Administrative Issues	Xueqiao Xu, LLNL
Day 1 – SESSION 1 Overview and Introduction – Phil Snyder, Chair		
9:00 AM	Introduction and Overview of BOUT++ Project	Xueqiao Xu, LLNL
9:30 AM	Overview of the BOUT++ Code Structure	Ben Dudson/U York
10:00 AM	Break	
Day 1 – SESSION 2 Gyro-Fluid and GyroKinetic Models – Bruce Cohen, Chair		
10:30 AM	Role of BOUT++ Simulations in EPED Model & ELMs	Phil Snyder, GA
11:00 AM	Implementation of Landau-Fluid Closures for Toroidal Simulations in BOUT++	Andris Dimits, LLNL
11:30 AM	GTC Numerical Schemes, such as Particle Push, Gyro-Average, Poisson Solver, Geometry Setup and Boundary Conditions	Zhihong Lin, UC Irvine
12:00 PM	Plasma/wall interactions, relevance to BOUT++ simulations, and how they can be incorporated	Tom Rognlien, LLNL
12:30 PM	Lunch	All (<i>included in workshop's meal fee</i>)
Day 1 – BOUT++ Exercises		
2:00 PM	Hands-On Running Examples	Maxim Umansky, LLNL
3:00 PM	3-Field ELMs	Xueqiao Xu, LLNL
4:00 PM	Break	
4:30 PM	Use Corsica to Generate MHD Equilibria and Other Tools	Guoqiang Li, IPP-CAS
5:30 PM	Adjourn Day 1	Shuttle Bus Departs from LLNL to Hampton Inn

Sponsors: Lawrence Livermore National Laboratory and The University of York
LLNL Organizing Members: Xueqiao Xu (925) 423-7578 and Maxim Umansky (925) 422-6041
Meeting Coordinator: Irene Massiatt (925) 422-4281
LLNL No.: LLNL-WEB-619618; LLNL-MI-642419

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Wednesday, September 4, 2013 • HPCIC • Trailer 6475 • Telephone (925) 422-9173

Day 2 – Solvers		
7:30 AM	Shuttle Bus Departs Promptly from Hampton Inn	2850 Constitution Drive Livermore (phone 925-606-6400)
7:50 AM	Arrival at LVOC at HPCIC (<i>refer to workshop location/map on website</i>) BOUT++ Workshop Badging (<i>if you did not Attend Day 1</i>) and Morning Hospitality	All
Day 2 – SESSION 1 Solvers and Numerical Schemes – Milo Dorr, Chair		
8:00 AM	PETSc and PETSc in BOUT++	Jed Brown, ANL
8:30 AM	New Features in SUNDIALS: Suite of Nonlinear & Differential Algebraic Equation Solvers	Carol Woodward, LLNL
9:00 AM	IMEX in SUNDIALS	Dan Reynolds, Southern Methodist University
9:30 AM	Break / HPCIC Onsite LLNL Badging for NIF Tour	All
Day 2 – SESSION 2 Solvers and Numerical Schemes (continued) – Milo Dorr, Chair		
10:00 AM	High-Order Difference Methods for Cartesian and Curvilinear Grids	Bill Henshaw, LLNL
10:30 AM	Implementation and Experiences using Hypr in TEMPEST and COGENT	Milo Dorr, LLNL
11:00 AM	Implicit PIC	Guangye Chen, LANL
Group Discussions 1 – Milo Dorr, Chair		
11:30 AM	Extending BOUT++ Performance: Solvers, Time Integration, Preconditioning, Numerical Issues, Scalability Discussions	All
12:00 PM	Lunch	All (<i>included in your meal fee</i>)
12:50 PM	Board Shuttle Bus for NIF Tour	All
1:00 PM	NIF Tour	All
2:15 PM	Depart NIF Facility and Return to HPCIC	All
Day 2 – BOUT++ Exercises		
2:30 PM	Use Debugger and Other Performance Analysis Tools	Woo-Sun Yang, NERSC
3:45 PM	Break / Group Photo	All
4:30PM	Implementations of Physics-Based Preconditioners	Ben Dudson, U. York
5:45 PM	Adjourn Day 2	Shuttle Bus Departs to Dinner Location or Hampton Inn
6:30 PM	No Host Dinner (<i>optional</i>)	Porter's Restaurant – Poppy Ridge Golf Course

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Day 3 – Turbulence and ELMs		
7:30 AM	Shuttle Bus Departs Promptly from Hampton Inn	2850 Constitution Drive Livermore (phone 925-606-6400)
7:50 AM	Arrival at LVOC at HPCIC (<i>refer to workshop location/map on website</i>) BOUT++ Workshop Badging (<i>if you did not Attend Day 1 or Day 2</i>) and Morning Hospitality	All
Day 3 – SESSION 1 Turbulence – Bill Nevins, Chair		
8:00 AM	Problems in Turbulence and Multi-Scale Interaction for BOUT ++	Pat Diamond, WCI/UCSD
8:30 AM	Turbulence Simulation Needs from an Experimental Viewpoint	George McKee, UWM
9:00 AM	How to Implement Synthetic Diagnostics in BOUT++ Framework	Chris Holland, UCSD
9:30 AM	On the OMFIT Modeling Framework for Integrated Modelling	Orso Meneghini, GA/ORISE
10:00 AM	Break	
Day 3 – SESSION 2 Topical Application – Pat Diamond, Chair		
10:30 AM	BOUT++ Simulations of Edge Turbulence in Alcator C-Mod's EDA H-Mode	Evan Davis, MIT
10:50 AM	Non-Local Parallel Closures: Implementation & Application to Scrape-Off Layer Modelling	John Omotani, University of York
11:10 AM	Gyrofluid Simulations on KBM and ELMs using BOUT++	P. W. Xi, Peking University/LLNL
11:30 AM	Filament Simulations in the MAST SOL	Nick Walkden, Culham Science Centre
Group Discussions 2 – Pat Diamond and George Tynan, Co-Chairs		
11:50 AM	Vortex-Shear Layer Interactions, No Man's Land, and H Mode: experimental hints leading to edge simulation breakthroughs.	George Tynan, UCSD
12:05 AM	ELMs and Turbulence Validation Discussions	All
12:30 PM	Lunch	All (<i>included in your meal fee</i>)
Day 3 – BOUT++ Exercises and Poster Session I Integrating Modelling – Phil Snyder, Chair		
2:00 PM	Using VisIt for Visualization and Data Analysis	Eric Brugger, LLNL
3:30 PM	Break	
4:00 PM	Six-Field Two-Fluid Simulations	Tianyang Xia, IPP-CAS
4:30 PM	Poster Session I and Exercises	All
5:45 PM	Adjourn Day 3	Shuttle Bus Departs from LLNL to Hampton Inn

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Day 4 – BOUT++ Exercises on Solvers, Blob and RMP		
7:30 AM	Shuttle Bus Departs Promptly from Hampton Inn	2850 Constitution Drive Livermore (phone 925-606-6400)
7:50 AM	Arrival at LVOC at HPCIC (<i>refer to workshop location/map on website</i>) BOUT++ Workshop Badging (<i>if you did not Attend Day 1, Day 2 or Day 3</i>) & Morning Hospitality	All
Day 4 – BOUT++ Exercises		
8:00 AM	How to Use PETSc Solvers for Time-Stepping or Inversion Problems	Ben Dudson, U York
9:30AM	Gyro-Fluid Simulations using BOUT GLF Code	SS Kim, NFRI
10:30 AM	Break	
Group Discussions 3 – Tom Rognlien, Chair		
11:00 AM	BOUT++ mini-app implementation on nVIDIA GPUs using the nvAMG solver library	Praveen Narayanan, Nvidia Corp.
11:30 AM	Challenges that Currently Limit BOUT++	All
12:30 PM	Lunch	All (<i>included in your meal fee</i>)
Day 4– BOUT++ Exercises and Poster Session II		
2:00 PM	Using eigenvalue methods for V&V	Maxim Umansky, LLNL
3:00 PM	RMP Simulations in Slab	Ilon Joseph, LLNL
4:00 PM	Break and Poster Session II	All
5:00 PM	Adjourn Final Day	Shuttle Bus Departs from LLNL to Hampton Inn

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Thursday, September 5, 2013 • **POSTER SESSION I** - Validations of Simulation Models

Poster #	Title	Primary Author
Poster 1	Validation of BOUT++ ELM Simulations for the EAST Tokamak Discharges	Zixi Liu, Institute of Plasma Physics, CAS
Poster 2	Comparison of Collisional Drift-Wave Simulation with CSDX Experimental Results	P. Vaezi, University of California at San Diego
Poster 3	Validation of BOUT++ ELM Simulation by Comparison with ECEI Measurements in the KSTAR Tokamak	M. Kim, POSTECH, Pohang, Gyeongbuk, South Korea
Poster 4	BOUT++ Simulations of Edge Turbulence in Alcator C-Mod's EDA H-Mode	E. M. Davis, MIT PSFC
Poster 5	Experimental Validation by Global Gyrokinetic Particle Simulation	Yong Xiao, Zhejiang University
Poster 6	Low-Wavenumber Pedestal Turbulence in NSTX: Measurements, Parametric Scalings, and Simulations	David R. Smith, University of Wisconsin-Madison
Poster 7	Filament Simulations in the MAST SOL	Nicholas R. Walkden, Culham Science Centre
Poster 8	Simulations of Turbulence in Tokamak Edge and Effects of Self-Consistent Zonal Flows	Bruce Cohen, LLNL

Friday, September 6, 2013 • **POSTER SESSION II** - Two-Fluid, Gyro-Fluid Simulation Models

Poster #	Title	Primary Author
Poster 1	BOUT++ Simulation of Edge Transport Barrier Formation and ELM Crash	G. Y. Park, National Fusion Research Institute
Poster 2	Peeling Ballooning Mode Simulation in "Snowflake" Divertor Configuration using BOUT++	Jingfei Mai, University of Texas at Austin
Poster 3	Analysis of Different Responses of Ion & Electron in Six-Field Two-Fluid ELM Simulations	C. H. Ma, Peking University
Poster 4	Non-Local Parallel Closures: Implementation & Application to Scrape-Off Layer Modelling	John Omotani, University of York
Poster 5	Turbulent Simulation Analysis Methods	Brett Friedman, UCLA
Poster 6	Interactions Between Tearing Modes and Microturbulence	Olivier Izacard, University of California at San Diego
Poster 7	Self-Consistent Simulation of Pfirsch-Schluter Flows and Turbulence in X-Point Geometry using BOUT++	Ben Dudson, University of York
Poster 8	Gyrofluid Simulations on KBM and ELMs using BOUT++	P. W. Xi, Peking University

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